Water Technologies for Rural Texas

Water Reuse and Recycling

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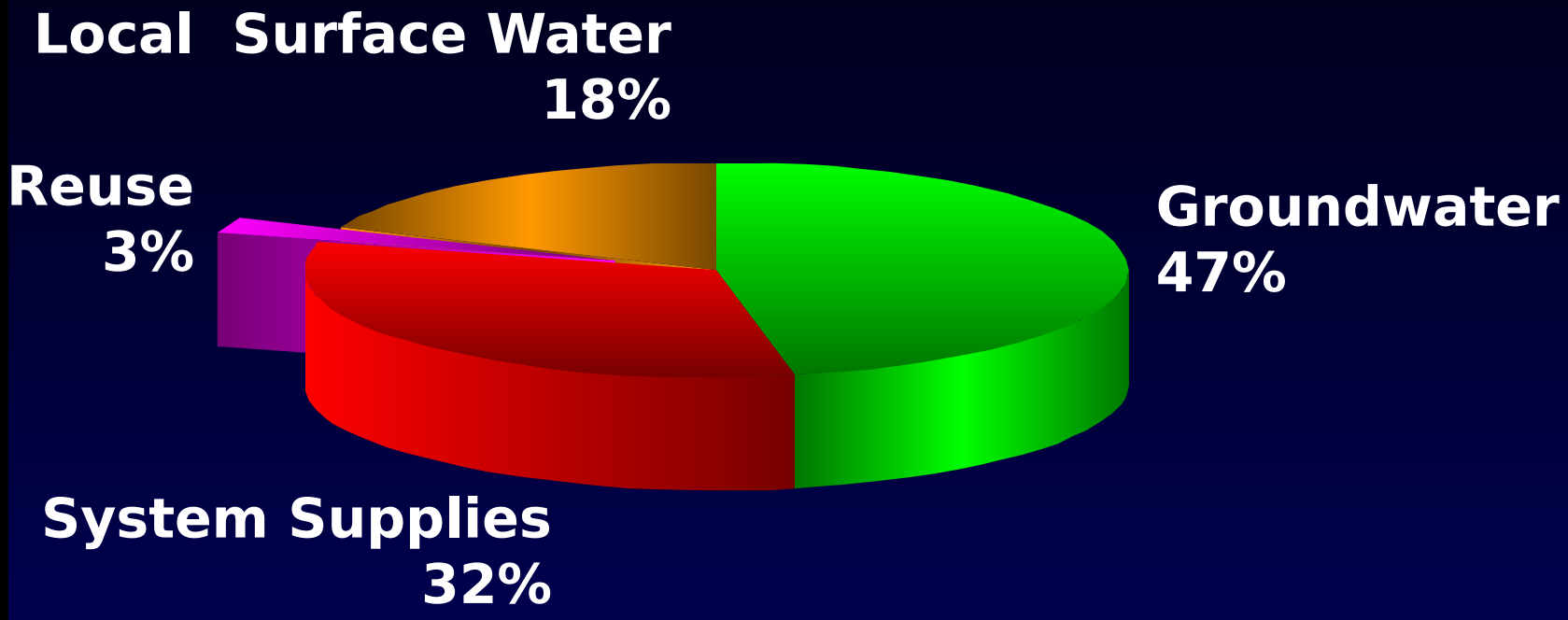
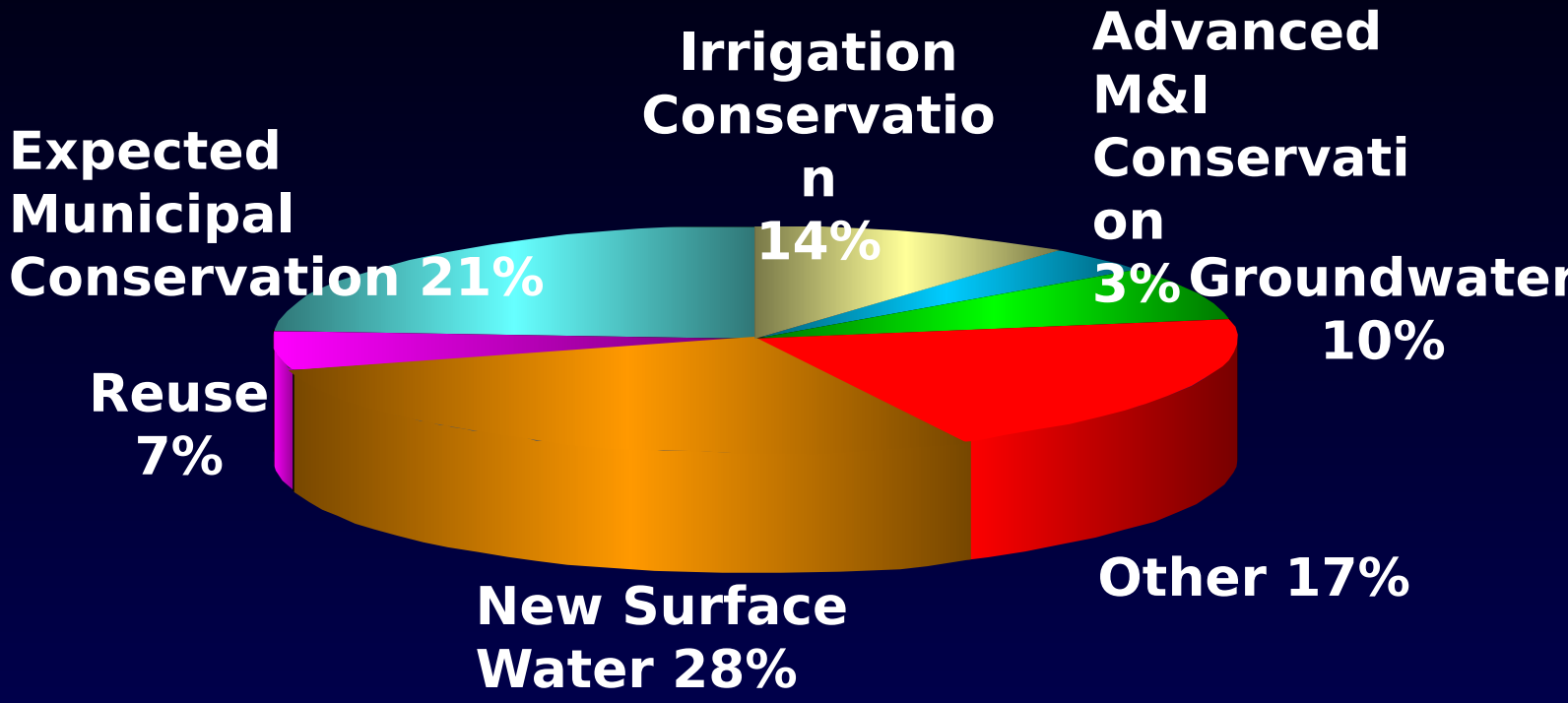
ALAN PLUMMER ASSOCIATES INC.
ENVIRONMENTAL ENGINEERS - DESIGNERS - SCIENTISTS

Available Water Supplies Statewide (YR 2000)



Total Available Supply = 18.4 million ac-ft/yr

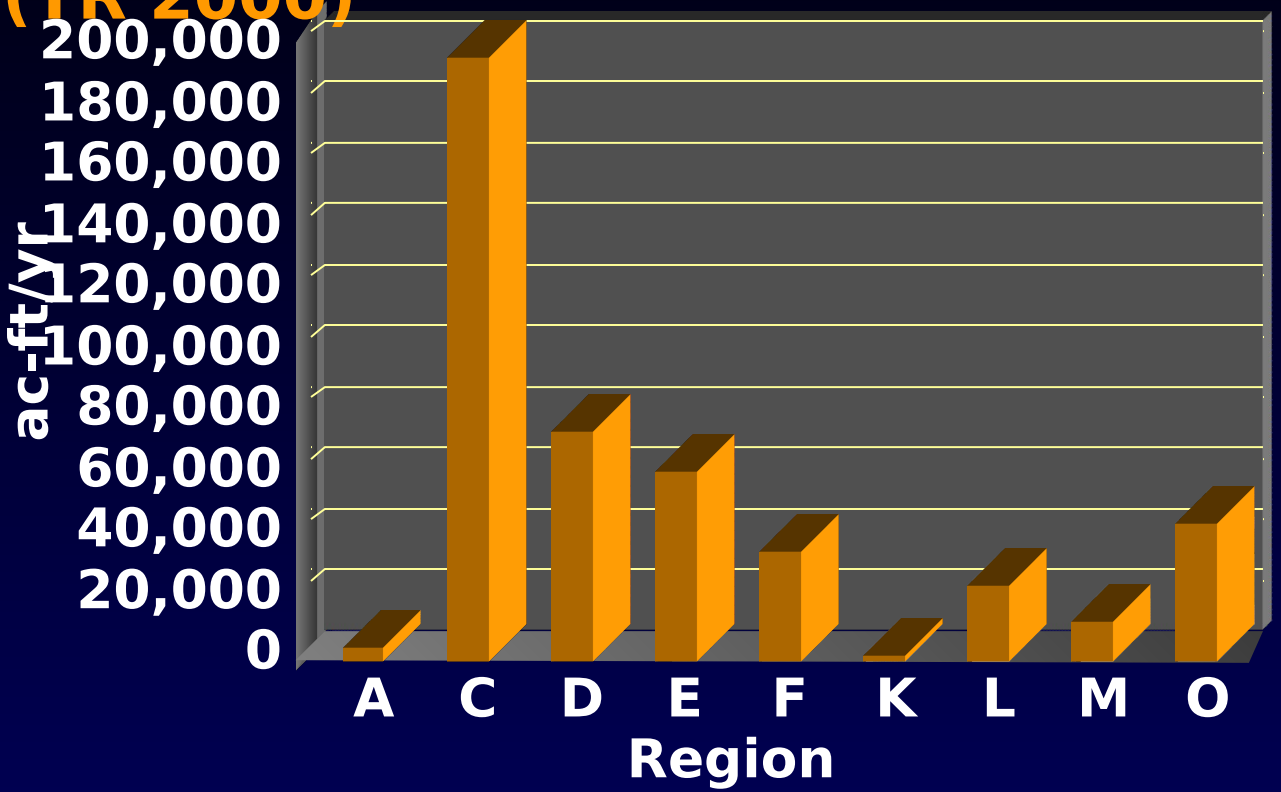
Projected Water Supply Development



Projected new 2050 supplies ~ 7 million ac-ft/

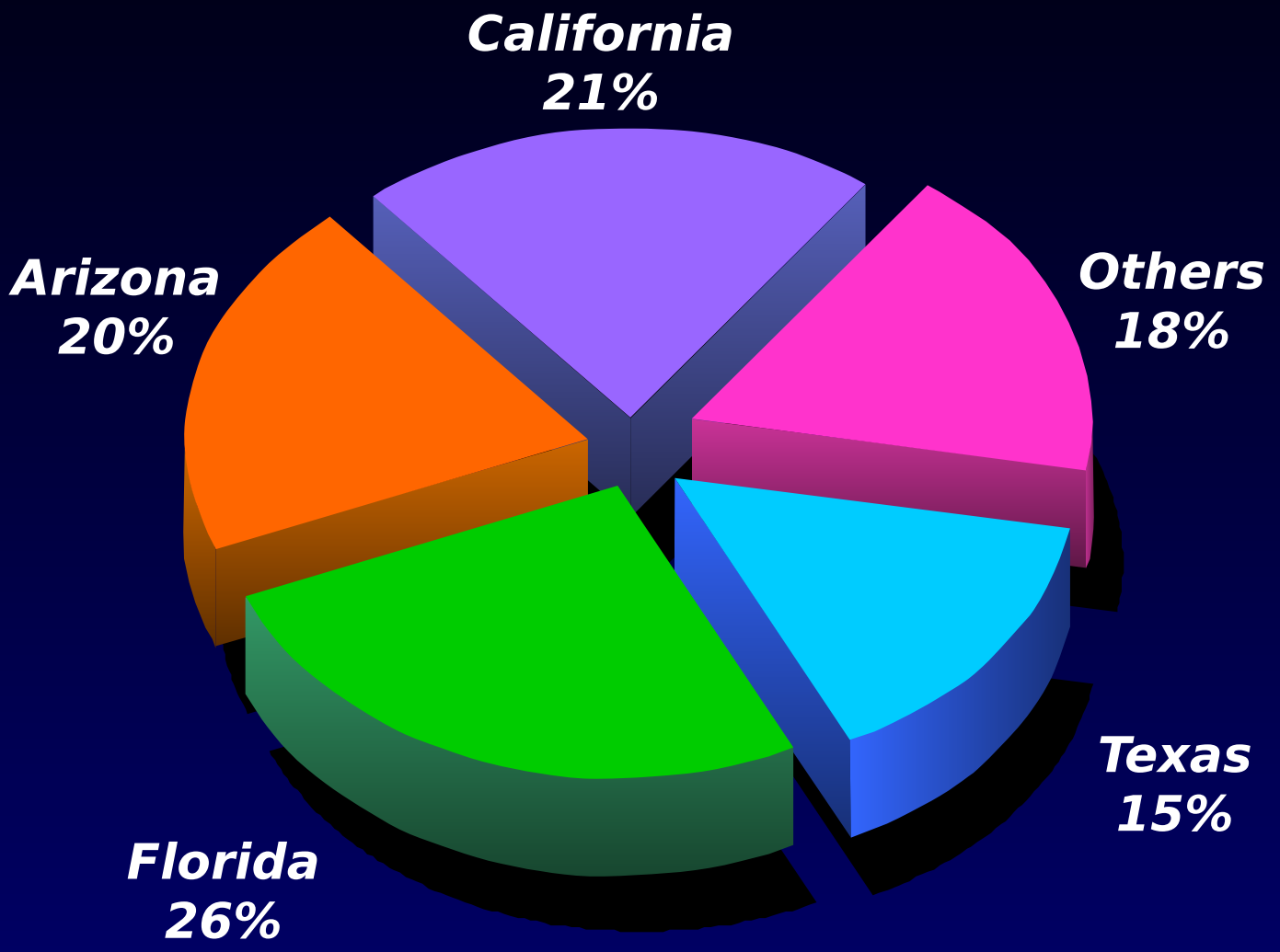
Reuse Availability by Region

(YR 2000)



Total Reuse Availability = 460,000 ac-ft/

Successful Reuse
USA Reuse



California Statistics

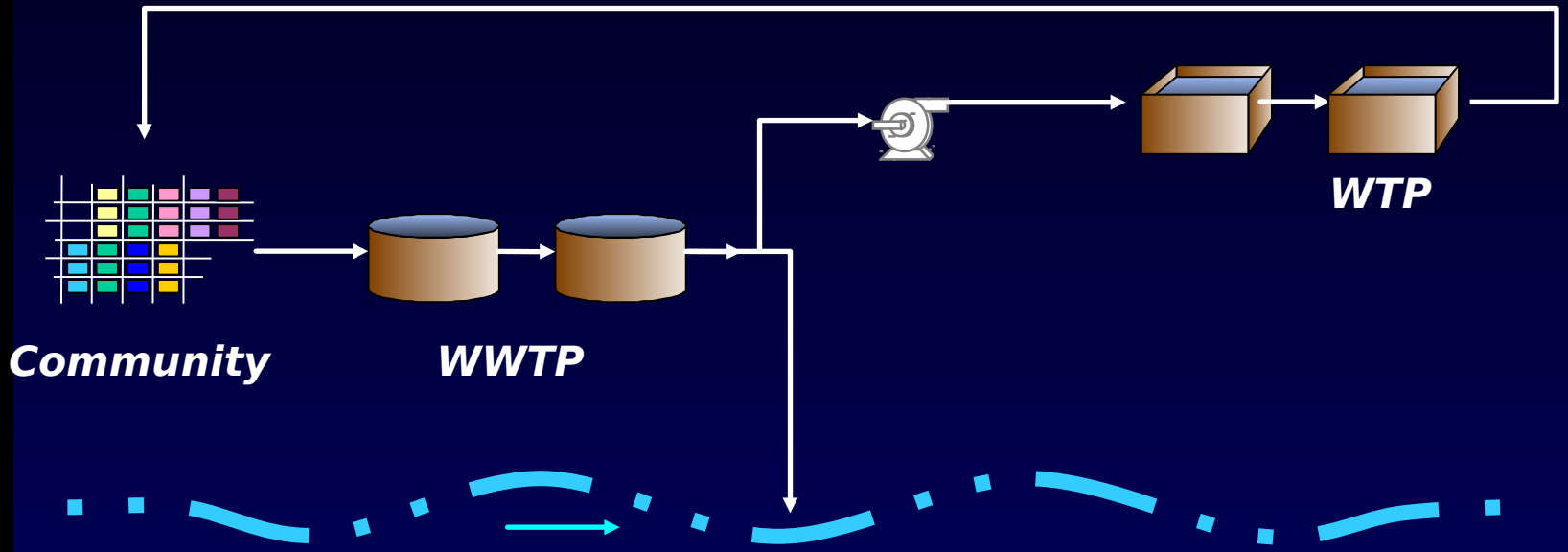
- 234 wastewater treatment facilities provide water for approximately 4,840 sites
- About 525,000 ac-ft/yr (468 MGD) of treated municipal wastewater is currently being recycled.

(Source: State Water Resources Control Board, 2002)

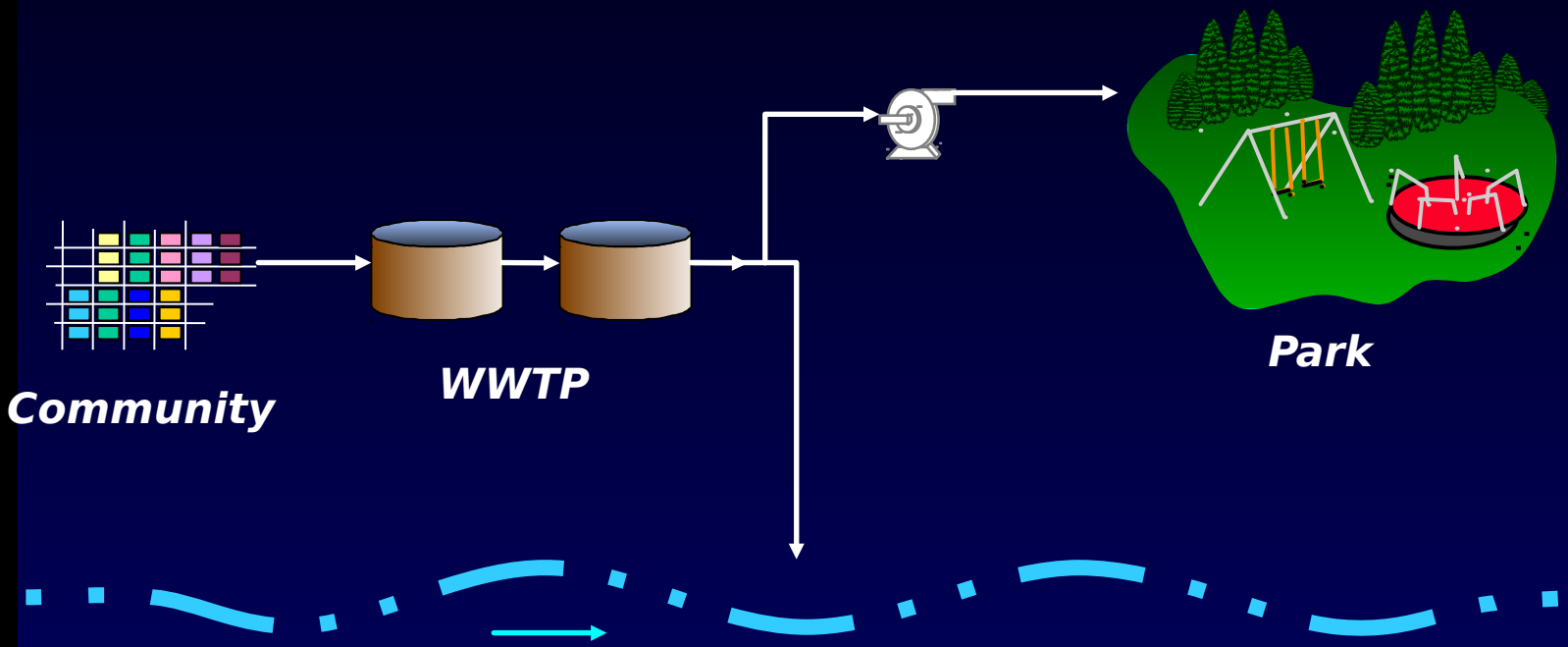
Florida Statistics

- 461 domestic wastewater treatment facilities provide water for 431 reuse systems
- Capacity of reuse facilities was 1151 MGD (2001)
- About 654,600 ac-ft/yr (584 MGD) of reclaimed water used (2001)

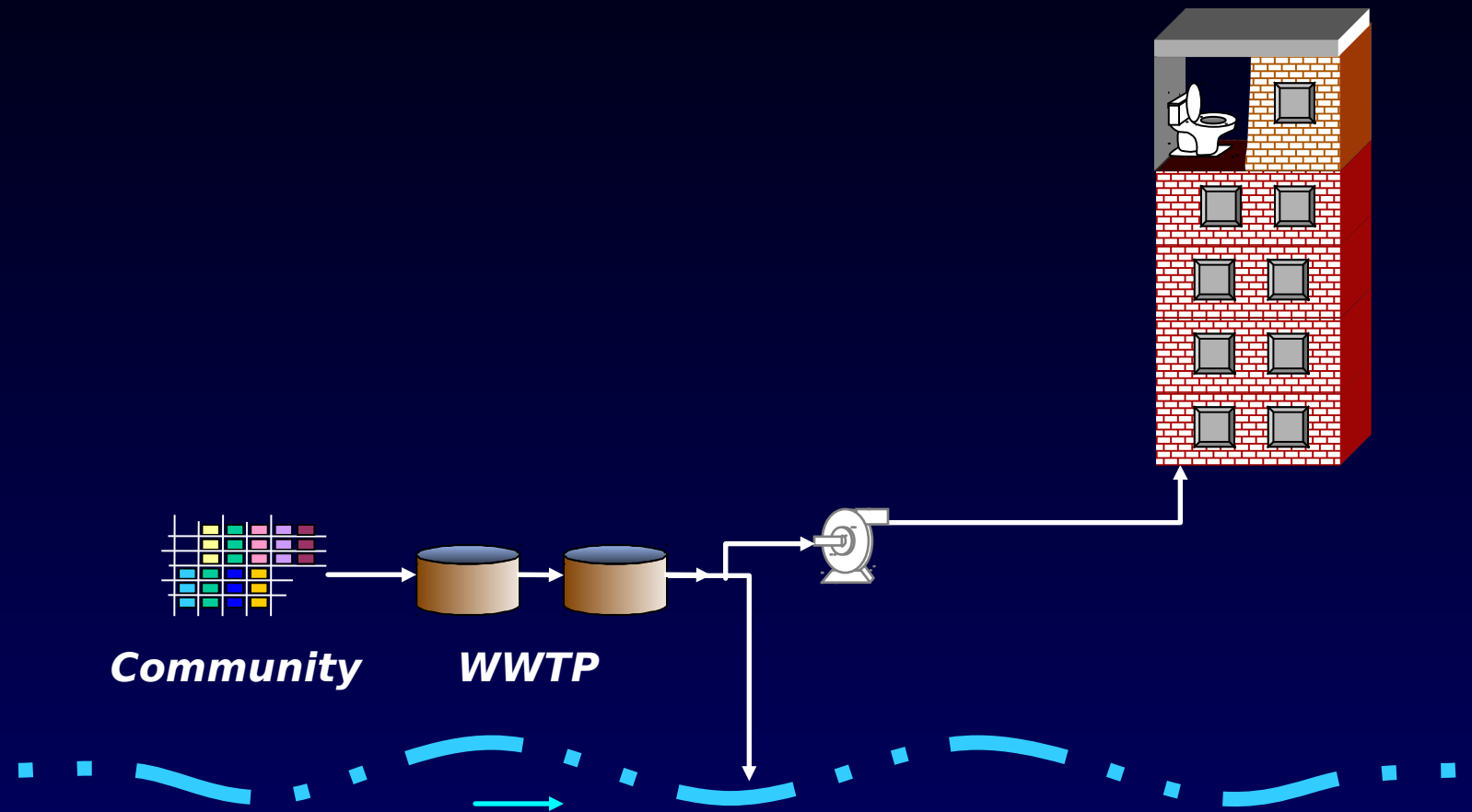
Direct Reuse - Drinking Water Supply (Expanded Advanced Treatment)



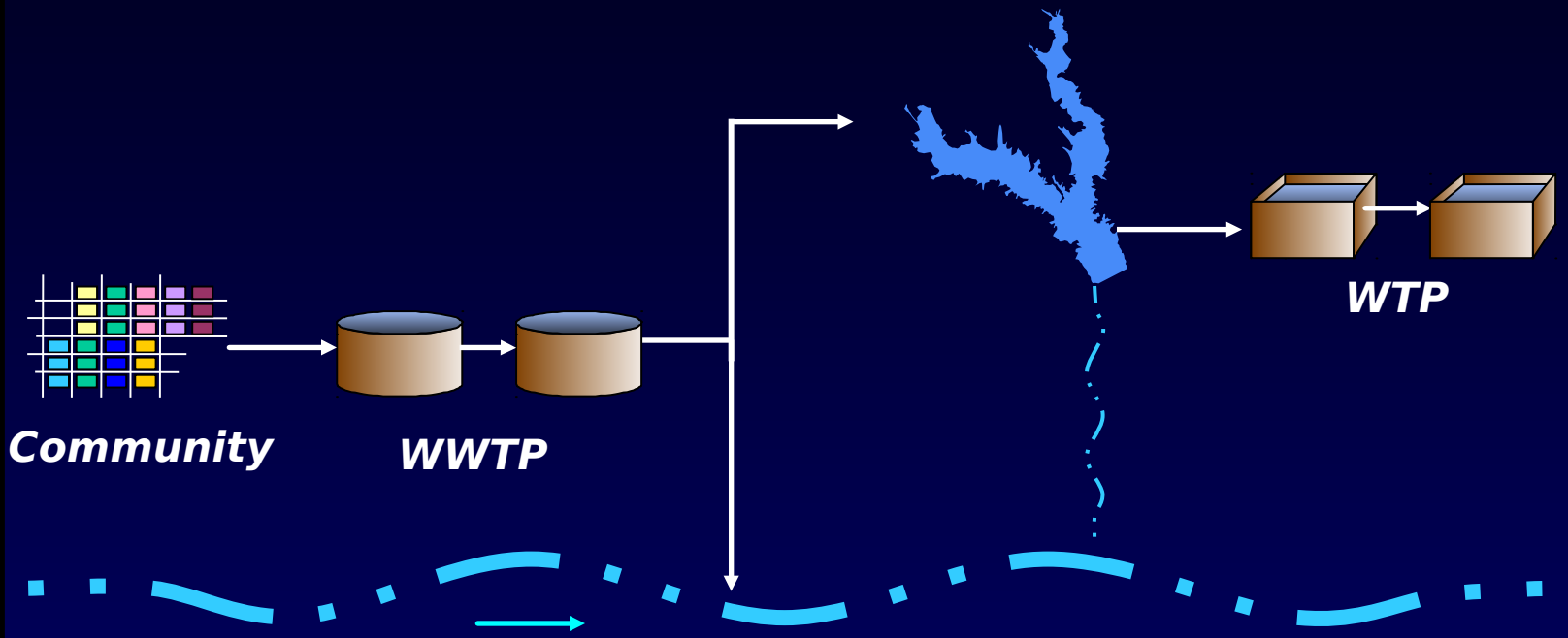
Direct Reuse (Park Irrigation)
Type I Water Quality



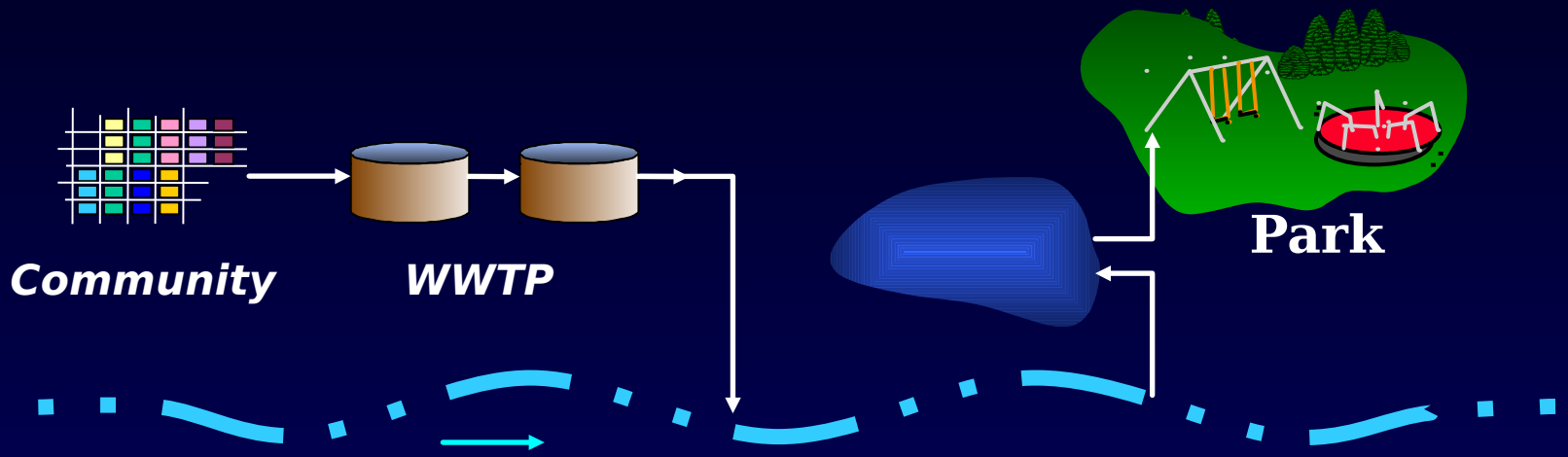
Direct Reuse (Toilet Flush etc.) Type I Water Quality



Indirect Reuse Drinking W Supply (Multiple Barriers – Advanced Treatment/ Detention Time/Blending)



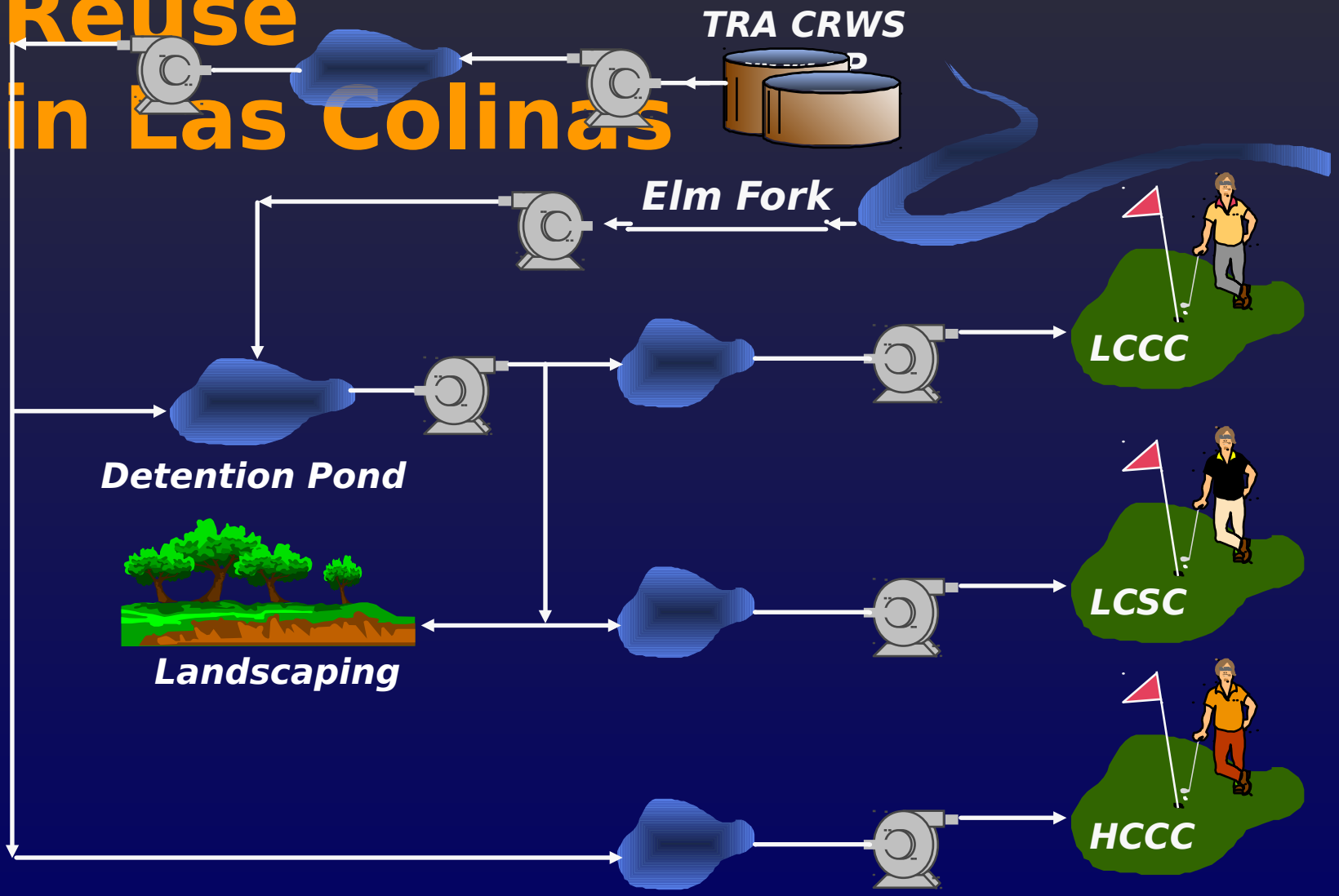
Indirect Reuse (Park Irrigation)



Las Colinas Water Reuse

Las Colinas Water Reuse

System Schematic Water Reuse in Las Colinas



Raw Water Quantities by Type of Use

Type of Use	Surface Water (BG)	Reclaimed Water (BG)	Total Water (BG)
Water surface evaporation makeup	2.976	1.903	4.879
Median landscape and open space	0.523	0.335	0.858
Golf course	3.738	2.340	6.128
Corporate headquarters landscape area	0.284	0.180	0.4643
Totals	7.521	4.808	12.329

(Note: Raw water provided for irrigation of corporate headquarters since

richland-chambers
WETLAND WATER REUSE PROJECT

District Long-Range Water Supply 1990 Planning

- Determined that additional water supply is needed
- Identified and evaluated several options
- Concluded that District should pursue option to divert water from Trinity River into District Reservoirs

District Investigation of Trinity River Diversion Option

- Trinity River Quality Assessment indicated that polishing treatment is required
- Evaluated several treatment options
- Selected Wetland Treatment System

Operating Concept for Proposed District Supply Projec

EXISTING SUPPLY

Richland-Chambers
Cedar Creek
Bridgeport
Eagle Mtn.
Benbrook
Arlington

FUTURE SUPPLY

Cedar Creek

Trinity River

Richland-Chambers

Diversion

Diversion

Phase II Wetland

Current Wetland

District Pilot-scale Wetland Research – To Plant or Not To Plant?

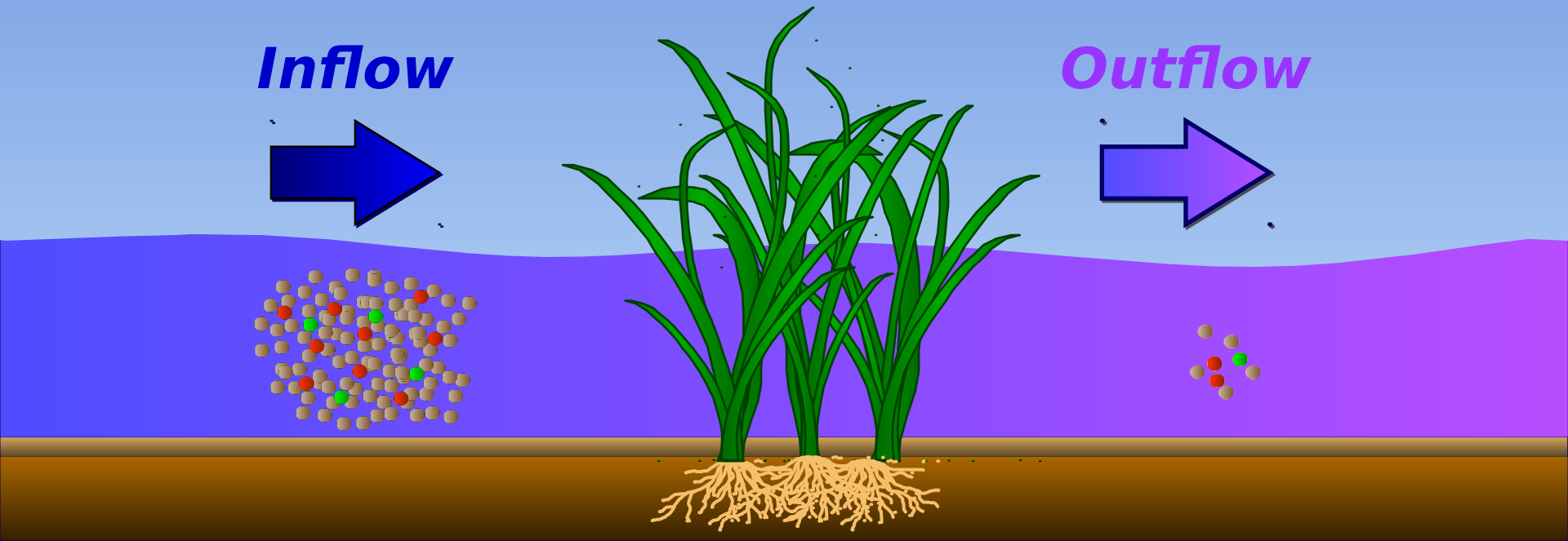
- Native plants were planted in two trains while no planting was done in the third train
- Research determined that only selective planting is r
- The District will save projected $6 million by minimal planting in full-scale system

District Pilot-Scale Wetlands Research – Can Plants Survive Periodic Flooding?

Some of the potential wetland sites were in areas that periodically experience flooding conditions

Pilot-Scale Wetland Research

Performance Summary of Pilot-Scale System	
Parameter	**Percent Mass Removed**
Total Suspended Solids	> 95%
Nitrogen	> 80%
Phosphorus	> 65%

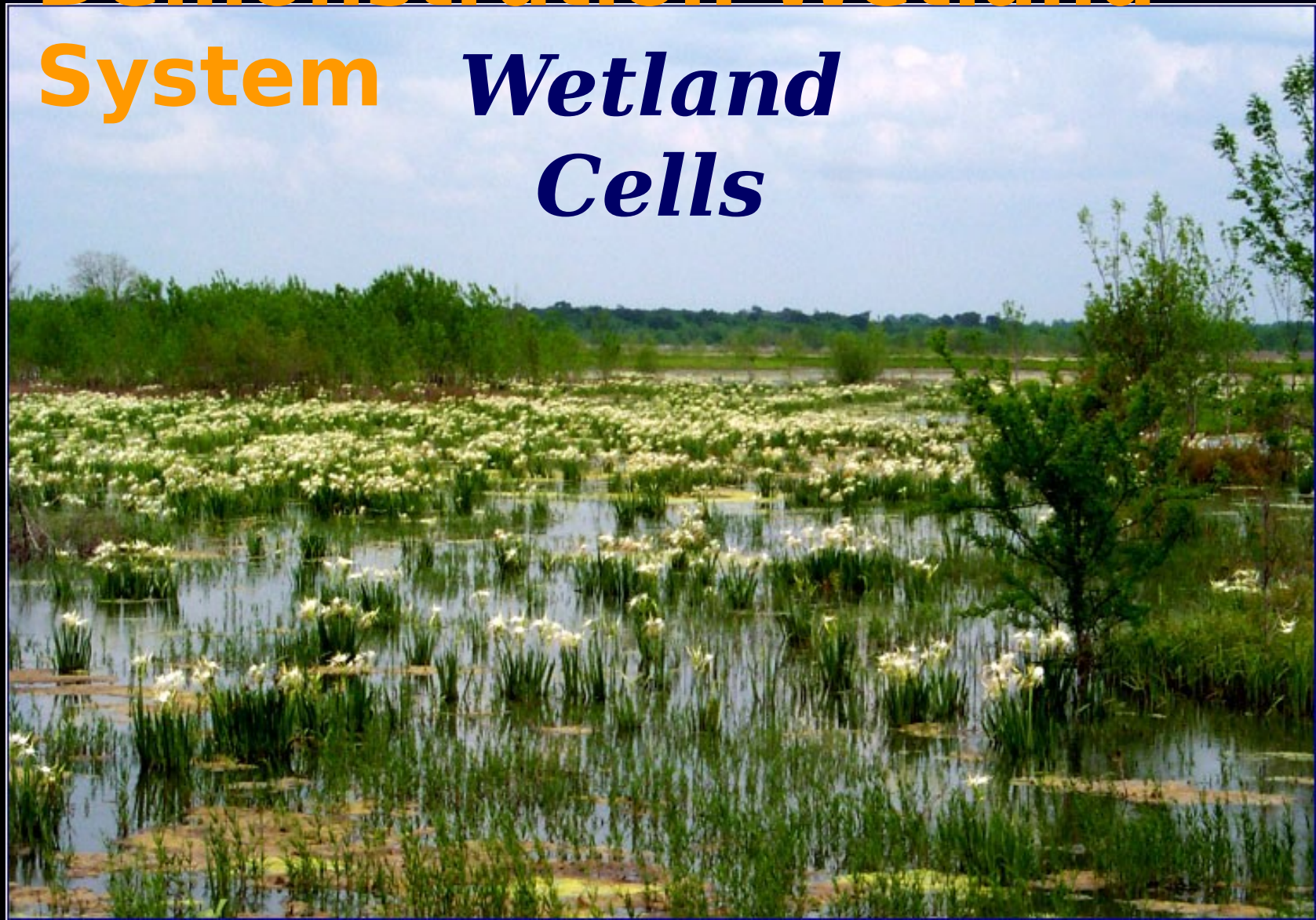


District Field-Scale Demonstration Wetland

District Field-Scale Demonstration Wetland System

Trinity River Pump Station

District Field-Scale Demonstration Wetland System



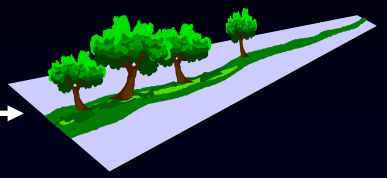
Integrated Water Supply and Wildlife Habitat System

- Is a reality due to the commitment of the District and TPWD
- Is the first of its kind in the nation
- Provides multiple benefits of both water supply and wildlife habitat

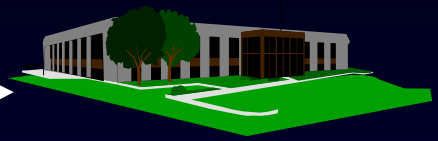
Reclaimed Water Use in Odessa

Bob Derrington Water Reclamation Plant

TXDOT



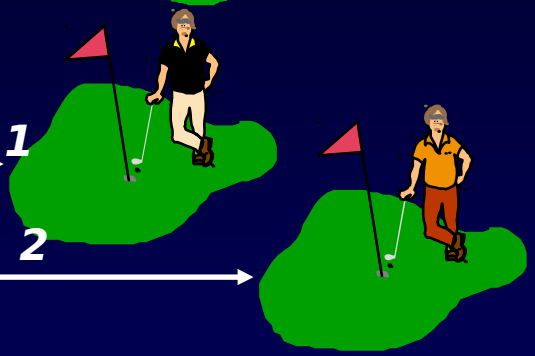
University



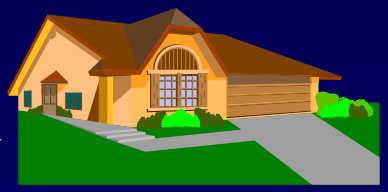
Playground

Golf Course 1

Golf Course 2

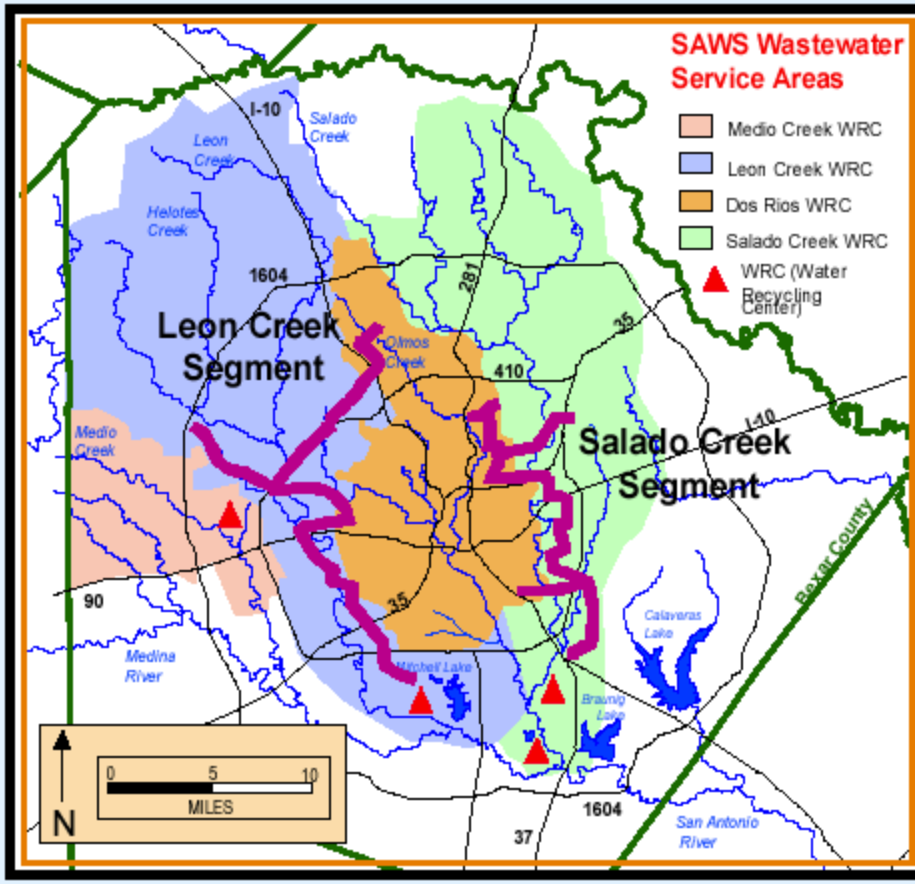


Residential Irrigation



Recycled Water Project

- Project to supply 35,000 acre-feet per yr
- Replaces current uses of potable water
  - Irrigation
  - Heating and Cooling towers
  - River flow
- 25,000 ac/ft committed
- Over 13,000 acre-ft currently online
- Total Cost: $125m



Recycled water uses